

FORM PTO-1390 (Modified)
(REV 11-2000)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

R.35482

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

10/088897

INTERNATIONAL APPLICATION NO.
PCT/DE 00/03393INTERNATIONAL FILING DATE
28 September 2000PRIORITY DATE CLAIMED
29 September 1999

TITLE OF INVENTION

INJECTOR FOR A FUEL INJECTION SYSTEM FOR INTERNAL COMBUSTION
ENGINES WITH AN INTEGRATED SYSTEM PRESSURE SUPPLY

APPLICANT(S) FOR DO/EO/US

Patrick MATTES

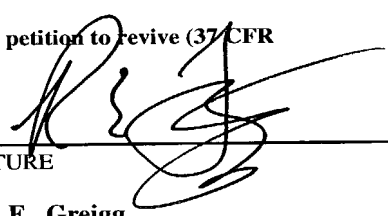
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
 - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☒ is attached hereto.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☒ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
8. ☒ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☒ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A copy of the International Search Report (PCT/ISA/210).

Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☐ Certificate of Mailing by Express Mail
23. ☒ Other items or information:

Transmittal Sheets in duplicate w/ fees charged to Dep. Acct. 07-2100 - Copy of German Text Appl. w/3 sheets drawings-
Transl. of German Text Appl. w/3 sheets drawings- Copy of German Text Amended Pages- Transl. of German Text
Amended Pages- Preliminary Amendment- Letter to Official Draftsman w/markings in red- Copies of PCT/RO/101,
PCT/ISA/210 and 220, and PCT/IPEA/401,409, and 416- Executed Declaration and Assignment (NOT ENCLOSED)

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.101) 70/088897		INTERNATIONAL APPLICATION NO. PCT/DE 00/03393		ATTORNEY'S DOCKET NUMBER R.35482	
24. The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) : <div style="margin-left: 20px;"><input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1040.00 <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00</div> ENTER APPROPRIATE BASIC FEE AMOUNT = \$890.00				CALCULATIONS PTO USE ONLY	
Surcharge of \$130.00 for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)). <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30				\$130.00	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	19 - 20 =	0	x \$18.00	\$0.00	
Independent claims	- 3 =	0	x \$84.00	\$0.00	
Multiple Dependent Claims (check if applicable). <input type="checkbox"/>				\$0.00	
TOTAL OF ABOVE CALCULATIONS =				\$1,020.00	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27). The fees indicated above are reduced by 1/2.				\$0.00	
SUBTOTAL =				\$1,020.00	
Processing fee of \$130.00 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)). <input type="checkbox"/> 20 <input type="checkbox"/> 30 +				\$0.00	
TOTAL NATIONAL FEE =				\$1,020.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input type="checkbox"/>				\$0.00	
TOTAL FEES ENCLOSED =				\$1,020.00	
				Amount to be: refunded	\$
				charged	\$
<div style="margin-left: 20px;">a. <input type="checkbox"/> A check in the amount of _____ to cover the above fees is enclosed. b. <input checked="" type="checkbox"/> Please charge my Deposit Account No. 07-2100 in the amount of \$1,020.00 to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 07-2100 A duplicate copy of this sheet is enclosed. d. <input type="checkbox"/> Fees are to be charged to a credit card. WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.</div> <div style="margin-top: 20px;">NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.</div> <div style="margin-top: 10px;">SEND ALL CORRESPONDENCE TO:<div style="border: 1px solid black; padding: 5px; margin-top: 5px;">Ronald E. Greigg Customer No. 02119 Greigg & Greigg, P.L.L.C. 1423 Powhatan Street Unit One Alexandria, VA 22314 Telephone: (703) 838-5500 Facsimile: (703) 838-5554</div></div>					
				SIGNATURE  Ronald E. Greigg	
				NAME 31,517	
				REGISTRATION NUMBER 25 March 2002	
				DATE	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Patrick MATTES

Based on PCT/DE 00/03393

For: INJECTOR FOR A FUEL INJECTION SYSTEM FOR INTERNAL COMBUSTION
ENGINES WITH AN INTEGRATED SYSTEM PRESSURE SUPPLY

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-referenced application as follows:

IN THE SPECIFICATION

Page 1, Between the title and paragraph [0001] insert the following:

[0000.2] CROSS-REFERENCE TO RELATED APPLICATIONS

[0000.4] This application is a 35 U.S.C. application of PCT/DE 00/03393, filed on
September 28, 2000.

[0000.6] BACKGROUND OF THE INVENTION

Replace paragraph [0001] with the following rewritten paragraph:

[0001] Field Of The Invention

Between paragraphs [0001] and [0002] insert the following:

[0002.5] Description Of The Prior Art

Page 3, Replace paragraph [0010] with the following rewritten paragraph:

[0010] In one embodiment of the invention, it is provided that on one end of the bush, the longitudinal bore, bush and bore are sealed off from one another, and that in the region of this end, the conduit to the system pressure supply branches off from the bore, so that the fuel that is under high pressure from the high-pressure connection cannot flow into the conduit to the system pressure supply in a short circuit, bypassing the annular gap between the bore and the bush.

Page 4, Between paragraphs [0015] and [0016] insert the following:

[0015.5] BRIEF DESCRIPTION OF THE DRAWINGS

Replace paragraph [0016] with the following rewritten paragraph:

[0016] Further advantages and advantageous features of the invention can be learned from the following detailed description, taken with the drawings, in which:

Between paragraphs [0020] and [0021] insert the following:

[0020.5] DESCRIPTION OF THE PREFERRED EMBODIMENTS

Replace paragraph [0021] with the following rewritten paragraph:

[0021] Fig. 1 shows an injector of the invention, with a housing 1 on whose upper end is a high-pressure connection 3. In the installed state of the injector, a high-pressure line, not shown, opens into this high-pressure connection 3 and supplies the injector with fuel, which is at high pressure P_{cr} , from the common rail, also not shown, or the injection pump, likewise not shown. The high-pressure connection 3 has a bore 5. A rod filter 7 is disposed in the upper part of the bore and prevents contaminants from reaching the injector. Below the rod filter 7, a bush 9 is disposed in the bore 5. The bush 9 has a longitudinal bore 11. Through the longitudinal bore 11, a hydraulic communication is established between the high-pressure line, not shown, and an inflow conduit 13, which supplies the control valve, not shown, and the injection nozzle with fuel that is at high pressure. A conduit 15 to the system pressure supply branches off in the lower region of the bore 5.

IN THE CLAIMS

Please cancel claims 1-10 and add new claims 11-29.

11. An injector for a fuel injection system for internal combustion engines, comprising
a high-pressure connection (3), wherein the high-pressure connection (3)
communicates hydraulically with an inflow conduit (13) via a bore (5),

a conduit (15) to the system pressure supply branching off from the bore (5), and

a bush (9) with a longitudinal bore (11) disposed in the bore (5),

the inflow conduit (13) being supplied with fuel from the high-pressure connection
(3) through the longitudinal bore (11) of the bush (9), and

the fuel inflow to the conduit (15) being effected outside the bush (9).

12. The injector of claim 11 wherein there is a play, in particular of 6 to 8 μm , between
the bore (5) and the bush (9).

13. The injector of claim 11 wherein on one end of the bush (9), the longitudinal bore
(11), bush (9) and bore (5) are sealed off from one another, and that in the region of
this end, the conduit (15) to the system pressure supply branches off from the bore (5).

14. The injector of claim 12 wherein on one end of the bush (9), the longitudinal bore
(11), bush (9) and bore (5) are sealed off from one another, and that in the region of
this end, the conduit (15) to the system pressure supply branches off from the bore (5).

15. The injector of claim 11 wherein both ends of the bush (9) are approximately equally spaced from the branching point of the conduit (15).
16. The injector of claim 12 wherein both ends of the bush (9) are approximately equally spaced from the branching point of the conduit (15).
17. The injector of claim 11 wherein the injector further comprising a leak fuel return line.
18. The injector of claim 17 wherein the leak fuel return line communicates with the conduit (15) to the system pressure supply.
19. The injector of claim 12 wherein the leak fuel return line communicates with the conduit (15) to the system pressure supply.
20. The injector of claim 13 wherein the leak fuel return line communicates with the conduit (15) to the system pressure supply.
21. The injector of claim 15 wherein the leak fuel return line communicates with the conduit (15) to the system pressure supply.
22. The injector of claim 17 further comprising a pressure holding valve (18) disposed in the leak fuel return line.

23. The injector of claim 18 further comprising a pressure holding valve (18) disposed in the leak fuel return line.

24. The injector of claim 11 wherein the pressure holding valve (18) maintains a minimum pressure, in particular of 15 to 20 bar, in the conduit (15) to the system pressure supply.

25. The injector of claim 13 wherein the pressure holding valve (18) maintains a minimum pressure, in particular of 15 to 20 bar, in the conduit (15) to the system pressure supply.

26. The injector of claim 15 wherein the pressure holding valve (18) maintains a minimum pressure, in particular of 15 to 20 bar, in the conduit (15) to the system pressure supply.

27. The injector of claim 17 wherein the pressure holding valve (18) maintains a minimum pressure, in particular of 15 to 20 bar, in the conduit (15) to the system pressure supply.

28. The injector of claim 11 wherein the injector has a piezoelectric actuator.

29. The injector of claim 28 characterized in that in the injector between the piezoelectric actuator and a control valve, a hydraulic booster is present, which is filled via the conduit (15) to the system pressure supply.

IN THE ABSTRACT

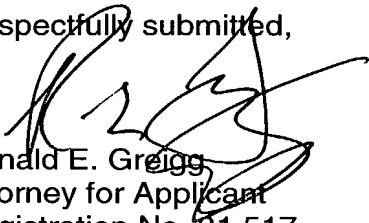
Please substitute the attached rewritten Abstract of the Disclosure for the Abstract as originally filed.

REMARKS

The above amendments are being made to place the application in better condition for examination.

Entry of the amendment is respectfully solicited.

Respectfully submitted,


Ronald E. Greigg
Attorney for Applicant
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Customer No. 02119

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REG/JLB/kg

5

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

Page 1, Paragraph [0001] has been amended as follows:

[0001] ~~Prior Art~~ Field Of The Invention

Page 3, Paragraph [0010] has been amended as follows:

[0010] In ~~a supplement to~~ one embodiment of the invention, it is provided that on one end of the bush, the longitudinal bore, bush and bore are sealed off from one another, and that in the region of this end, the conduit to the system pressure supply branches off from the bore, so that the fuel that is under high pressure from the high-pressure connection cannot flow into the conduit to the system pressure supply in a short circuit, bypassing the annular gap between the bore and the bush.

Page 4, Paragraph [0016] has been amended as follows:

[0016] Further advantages and advantageous features of the invention can be learned from the following ~~drawing, description and claims. Shown are~~ detailed description, taken with the drawings, in which:

Paragraph [0021] has been amended as follows:

[0021] Fig. 1 shows an injector of the invention, with a housing 1 on whose upper end is a high-pressure connection 3. In the installed state of the injector, a high-pressure line, not shown, opens into this high-pressure connection 3 and supplies the injector with fuel, which is at high pressure P_{cr} , from the common rail, also not shown, or the injection pump, likewise not shown. The high-pressure connection 3 has a bore 5. A rod filter 7 is disposed in the upper part of the bore and prevents contaminants from

reaching the injector. Below the rod filter 7, a bush 9 is disposed in the bore 5. The bush 9 has a longitudinal bore 11. Through the longitudinal bore 11, a hydraulic communication is established between the high-pressure line, not shown, and an inflow conduit 13, which supplies the control valve, not shown, and the injection nozzle with fuel that is at high pressure. A conduit 15 to the system pressure supply branches off in the lower region of the bore 5.

Page 7, Paragraph [0028] has been amended as follows:

[0028] In Fig. 3, the bush 9 is shown deformed. Neither the deformation of the bush 9 nor the size of the annular gap 19 is shown to scale but instead is shown only qualitatively. The pressure course in the annular gap is shown qualitatively in the P/X graph in Fig. 3. In this graph, "X" is the location coordinate extending in the direction of the longitudinal axis of the bore (5) 5.

Page 10, Abstract

Abstract ABSTRACT OF THE DISCLOSURE

An injector for a fuel injection system for internal combustion engines is proposed, whose system pressure supply is integrated with the injector. This results in a simple design with at the same time a low requirement for driving capacity on the part of the high-pressure pump for supplying system pressure.

(Fig. 1)

10/08889/

JC13 Rec'd PCT/PTO 25 MAR 2002

**SUBMISSION OF PROPOSED DRAWING AMENDMENT FOR APPROVAL BY
EXAMINER (37 CFR 1.121(a)(3)(ii) or 37 CFR 1.121(b)(3)(ii))**Docket No.
R.35482In Re Application Of: **Patrick MATTES**

Serial No.

Filing Date

Examiner

Art Unit

Invention: **INJECTOR FOR A FUEL INJECTION SYSTEM FOR INTERNAL COMBUSTION
ENGINES WITH AN INTEGRATED SYSTEM PRESSURE SUPPLY**

Address to:

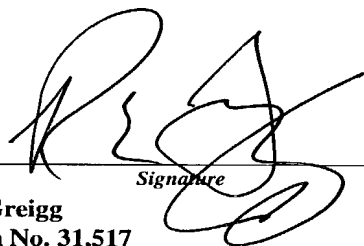
**Assistant Commissioner for Patents
Washington, D.C. 20231**

Attached please find:

(check applicable items)

- ☐ a sketch in permanent ink
- ☒ a copy of the original drawing(s) with red ink **FIGURE 2**

showing proposed changes to the drawing(s) in this application for which the approval of the examiner is requested.



Signature

**Ronald E. Greigg
Registration No. 31,517
Customer No. 02119****Greigg & Greigg, P.L.L.C.
1423 Powhatan Street, Unit One
Alexandria, VA 22314
(703) 838-5500/Telephone- (703) 838-5554/Facsimile**Dated: **25 MARCH 2002**

I certify that this document and fee is being deposited
on with the U.S. Postal Service as
first class mail under 37 C.F.R. 1.8 and is addressed to the
Assistant Commissioner for Patents, Washington, D.C.
20231.

Signature of Person Mailing Correspondence

Typed or Printed Name of Person Mailing Correspondence

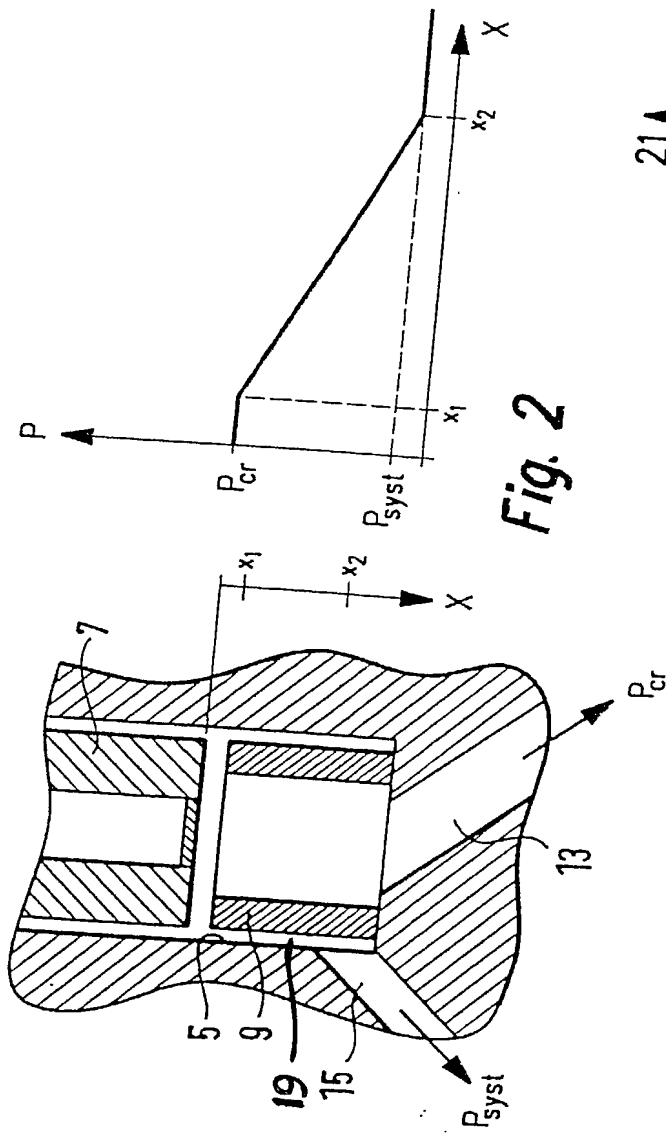


Fig. 2

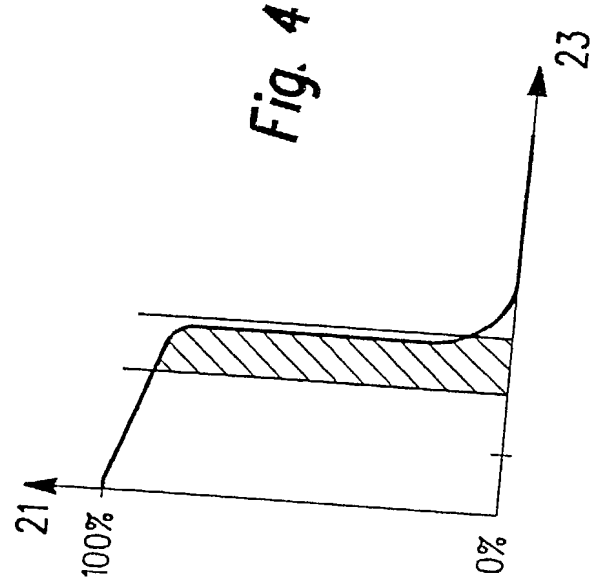


Fig. 4

INJECTOR FOR A FUEL INJECTION SYSTEM FOR INTERNAL COMBUSTION
ENGINES WITH AN INTEGRATED SYSTEM PRESSURE SUPPLY

[0001] Prior Art

[0002] The invention is based on an injector for a fuel injection system for internal combustion engines, having a high-pressure connection, the high-pressure connection communicating with an inflow conduit via a bore.

[0003] Some injectors, because of their design, require a system pressure that is markedly less than the pressure P_{cr} in the common rail, that is, the injection pressure. For instance, in injectors with a piezoelectric actuator, to lengthen the stroke of the piezoelectric actuator and compensate for the temperature-dictated length, a hydraulic booster is used. To fill this hydraulic booster, a system pressure of up to 20 bar must be present in the injector upon starting and during operation. Furnishing the requisite quantity of leak fuel is accomplished either by internal leaks in the injector or from outside.

[0004] Since in some embodiments of injectors no internal leaks occur, until now in these embodiments the pressure has had to be furnished from outside via high-pressure lines. Such an embodiment, because of the high pressure level and the high operating temperatures is expensive to produce and is vulnerable to malfunction.

[0005] Another disadvantage of the system pressure supply according to the prior art is that the system pressure is adjusted by means of throttles with a constant flow rate. This kind of throttling requires a high driving capacity on the part of the high-pressure pump and reduces the efficiency of the engine accordingly.

[0006] It is the object of the invention to furnish an injector with a piezoelectric actuator whose system pressure supply is simple, economical and operationally reliable. Moreover, the capacity requirement of the high-pressure pump for the system pressure supply should be low.

[0007] This object is attained according to the invention by an injector for a fuel injection system for internal combustion engines, having a high-pressure connection, the high-pressure connection communicating hydraulically with an inflow conduit via a bore, and a conduit to the system pressure supply branches off from the bore, and a bush with a longitudinal bore is disposed in the bore.

[0008] This injector has the advantage that in the annular gap between the bush and the bore, the high pressure from the high-pressure connection is reduced so far that at the point where the conduit to the system pressure supply branches off from the bore, essentially only the requisite system pressure now prevails. Thus the system pressure supply is integrated with the injector, so that expensive external system pressure supply lines that are vulnerable to malfunction can be dispensed with. Moreover, the fuel flow into the conduit to the system pressure supply decreases as the pressure in the high-pressure connection increases, so that the requirement for driving capacity on the part of the high-pressure pump for the system pressure supply is low. Moreover, simple hoses can be used to remove the leak fuel, since the leak fuel is removed without pressure.

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[0013] In other features of the invention, a pressure holding valve is disposed in the leak fuel return line, which maintains a minimum pressure, in particular of 15 to 20 bar, so that the requisite system pressure is always present.

[0014] A variant of the invention provides that the injector has a piezoelectric actuator, so that in injectors of this design as well, the advantages of the system pressure supply according to the invention can be utilized.

[0015] In a supplement to the invention, between the piezoelectric actuator and a control valve there is a hydraulic booster, which is filled via the conduit to the system pressure supply, so that the filling is accomplished simply and reliably.

[0016] Further advantages and advantageous features of the invention can be learned from the following drawing, description and claims. Shown are:

[0017] Fig. 1, a first embodiment of an injector of the invention in longitudinal section;

[0018] Fig. 2, a detail marked X of the injector of Fig. 1;

[0019] Fig. 3, a detail of a second embodiment of an injector of the invention in longitudinal section; and

[0020] Fig. 4, a qualitative graph of flow rate and pressure for a system pressure supply of the invention for an injector.

[0021] Fig. 1 shows an injector of the invention, with a housing 1 on whose upper end is a high-pressure connection 3. In the installed state of the injector, a high-pressure line, not shown, opens into this high-pressure connection 3 and supplies the injector with fuel, which is at high pressure P_{cr} , from the common rail, also not shown, or the

injection pump, likewise not shown. The high-pressure connection 3 has a bore 5. A rod filter 7 is disposed in the upper part of the bore and prevents contaminants from reaching the injector. Below the rod filter 7, a bush 9 is disposed in the bore 5. The bush 9 has a longitudinal bore 11. Through the longitudinal bore 11, a hydraulic communication is between the high-pressure line, not shown, and an inflow conduit 13, which supplies the control valve, not shown, and the injection nozzle with fuel that is at high pressure. A conduit 15 to the system pressure supply branches off in the lower region of the bore 5.

[0022] The bush 9 is joined sealingly at its lower face end to the bottom 17 of the bore 5. This means that the fuel that is under high pressure in the high-pressure connection 3 can reach the conduit 15 to the system pressure supply only through the annular gap between the bush 9 and the bore 5. In the process, a pressure reduction takes place, so that by the time the fuel reaches the conduit 15 to the system pressure supply, it has only the requisite system pressure P_{syst} of about 15 to 20 bar.

[0023] To prevent the flow rate in the conduit 15 to the system pressure supply from rising as well with increasing pressure P_{cr} in the high-pressure connection 3, the bush 9 is designed such that it is pressed in the direction of the bore 5 as a result of the pressure difference between the longitudinal bore 11 and the annular gap between the bush 9 and the bore 5. As a result, the annular gap between the bush 9 and the bore 5 is reduced in size, and the consequence is an increased reduction of pressure in the annular gap.

[0024] Above a pressure that is dependent on the design of the bush 9 and housing 1 as well as on the pressure in the high-pressure connection 3, the bush 9 is pressed against the bore 5, so that no further fuel from the high-pressure connection 3 can enter the conduit 15 to the system pressure supply. This prevents impermissibly high pressures from prevailing in the conduit 15 to the system pressure supply and in the

Claims

1. An injector for a fuel injection system for internal combustion engines, having a high-pressure connection (3), wherein the high-pressure connection (3) communicates hydraulically with an inflow conduit (13) via a bore (5), characterized in that a conduit (15) to the system pressure supply branches off from the bore (5), and that a bush (9) with a longitudinal bore (11) is disposed in the bore (5).
2. The injector of claim 1, characterized in that there is a play, in particular of 6 to 8 μm , between the bore (5) and the bush (9).
3. The injector of claim 1 or 2, characterized in that on one end of the bush (9), the longitudinal bore (11), bush (9) and bore (5) are sealed off from one another, and that in the region of this end, the conduit (15) to the system pressure supply branches off from the bore (5).
4. The injector of claim 1 or 2, characterized in that both ends of the bush (9) are approximately equally far away from the branching point of the conduit (15).
5. The injector of one of the foregoing claims, characterized in that the injector has a leak fuel return line.
6. The injector of claim 5, characterized in that the leak fuel return line communicates with the conduit (15) to the system pressure supply.
7. The injector of claim 5 or 6, characterized in that a pressure holding valve (18) is disposed in the leak fuel return line.

8. The injector of one of the foregoing claims, characterized in that the pressure holding valve (18) maintains a minimum pressure, in particular of 15 to 20 bar, in the conduit (15) to the system pressure supply.

9. The injector of one of the foregoing claims, characterized in that the injector has a piezoelectric actuator.

10. The injector of claim 9, characterized in that the injector between the piezoelectric actuator and a control valve, a hydraulic booster is present, which is filled via the conduit (15) to the system pressure supply.

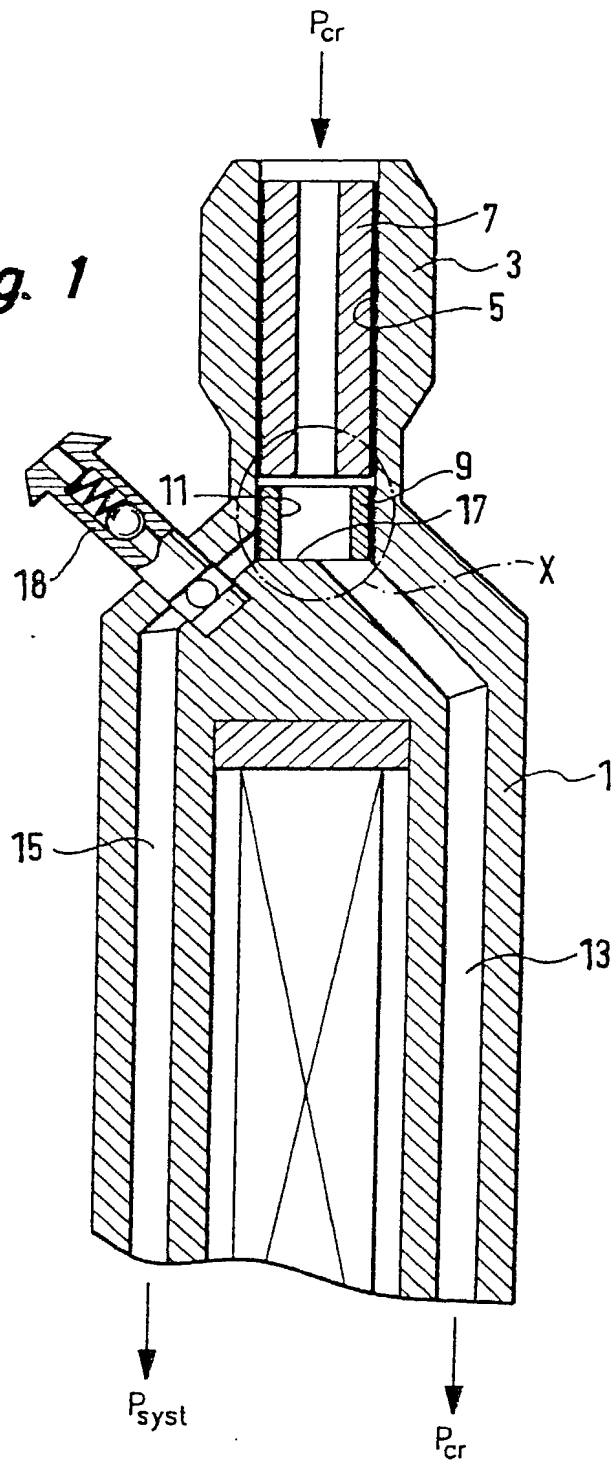
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1 / 3

Fig. 1



2 / 3

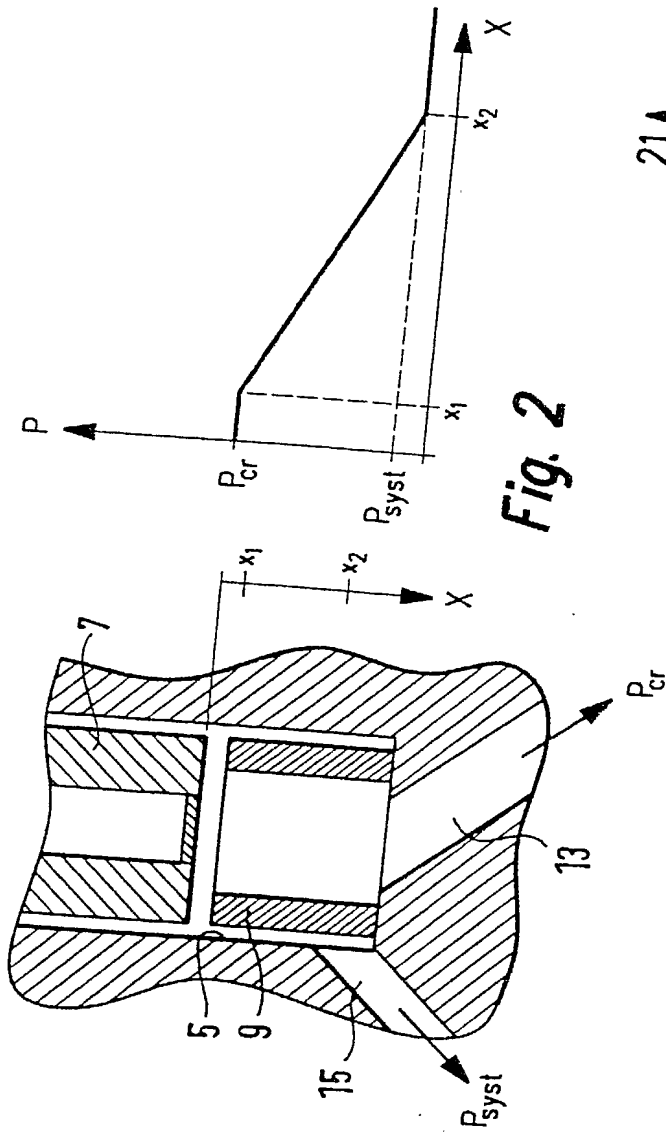


Fig. 2

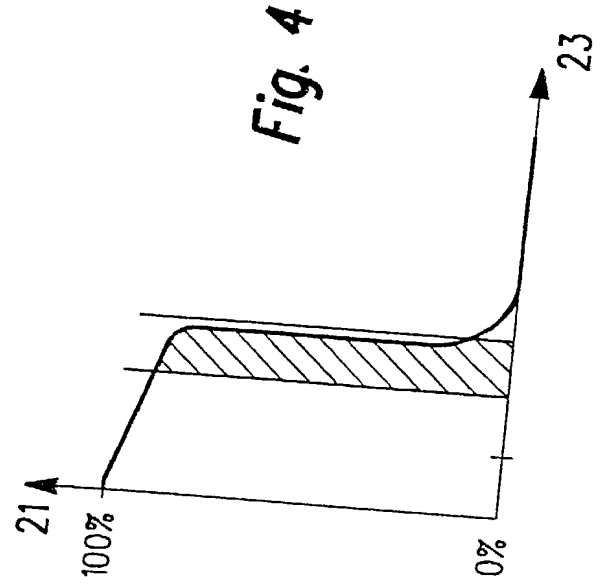


Fig. 4

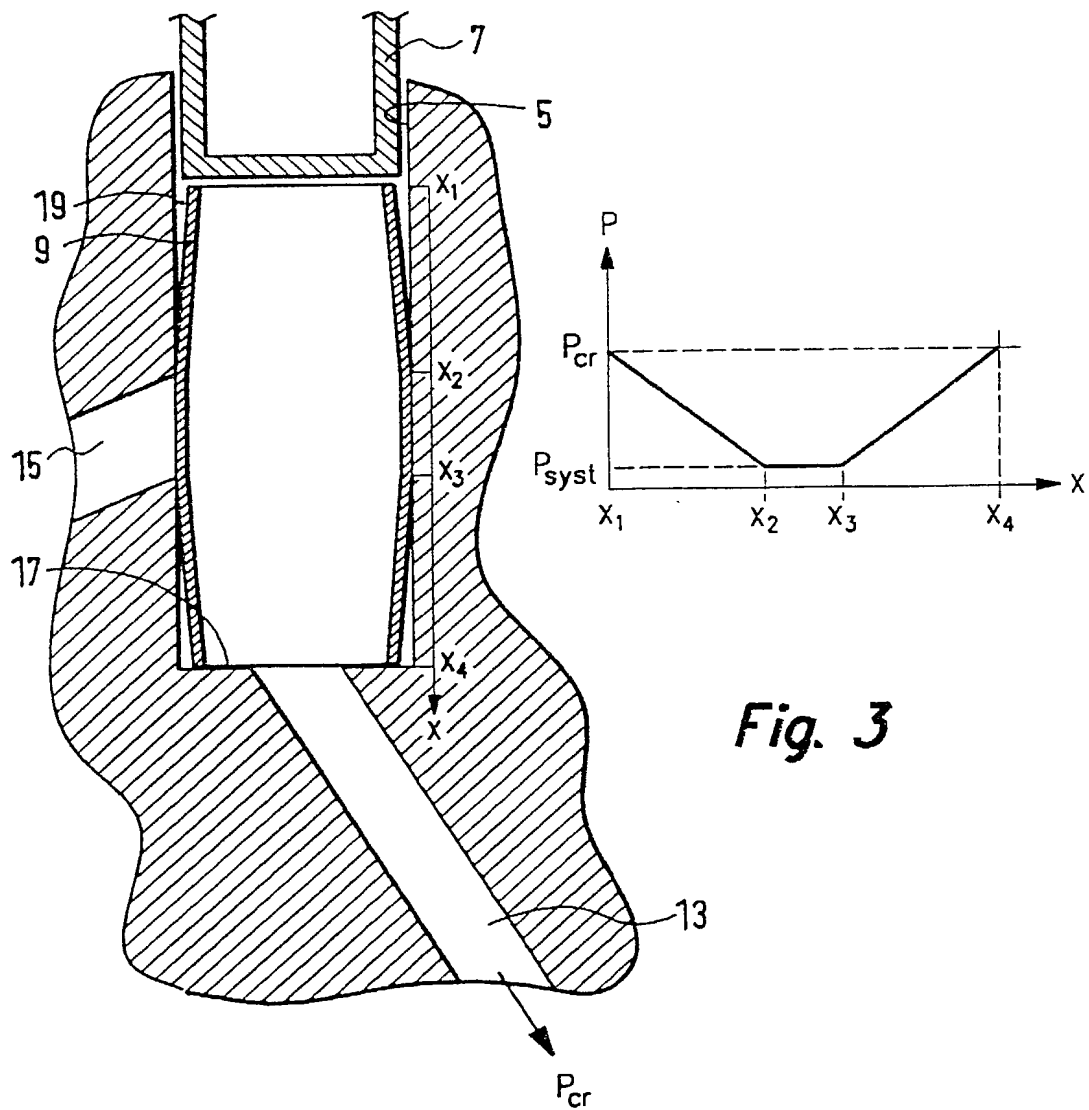


Fig. 3

Docket No.
R.35482

Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

INJECTOR FOR A FUEL INJECTION SYSTEM FOR INTERNAL COMBUSTION ENGINES WITH AN INTEGRATED SYSTEM PRESSURE SUPPLY

the specification of which

(check one)

☐ is attached hereto.

☒ was filed on 28 SEPTEMBER 2000 as United States Application No. or PCT International
Application Number PCT/DE 00/03393
and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.


I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority	Claimed
<u>1 99 46 612.2</u>	<u>GERMANY</u>	<u>29 SEPTEMBER 1999</u>		<input checked="" type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)		
<u> </u>	<u> </u>	<u> </u>		<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)		
<u> </u>	<u> </u>	<u> </u>		<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)		

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